University of Bahrain
College of Information Technology
Department of Computer Science
First Semester, 2014-2015
Computer Programming for Scientists and Engineers

SERIAL [redacted]

CSC 103 Test I

Date: 22nd October 2014 Time: 11:00 - 12:15

STUDENT NAME	[redacted]
STUDENT ID #	[redacted]

QUESTION #	MARKS		COMMENTS
1	10	10	
2	10	10	
3	10	10	
4	10	10	
TOTAL	40	40	

NOTE: THERE ARE SIX **(6) PAGES** IN THIS TEST
ONLY ONE SOLUTION WILL BE CONSIDERED FOR EACH QUESTION
LAST PAGE IS EMPTY

Question 1 (10 points)

Show your work clearly in each of the following parts

(A) Convert the following numbers from/to indicated bases:

i. $(1001011)_2 = (75)_{10}$

64 32 16 8 4 2 1

$64+8+2+1$

$= 75$

ii. $(3517)_8 = (74F)_{16}$

111 010 011 111

7 4 F

iii. $(176)_8 = (126)_{10}$

$1\times8^2 + 7\times8^1 + 6\times8^0$

$= 126$

iv. $(333)_{10} = (140)_{16}$

333	16	20	13 ⇒ D
20	16	1	4
1	16	0	1

(B) Perform the following arithmetic operation:

The binary multiplication (product) of 1010110 and 101

1010110

101 X

1010110

0000000

1010110 +

110101110

$(1010110)_2 * (101)_2 = (110101110)_2$

Question 2 (10 points)

What is the output of the following codes?

(1)

```
int x=4,  y=2,  z=9;
z += y;
cout<<"Z=" << z << endl;
z = x + z/y - 4%x;
cout<<"Z=" << z << endl;
z = --x + y--;
cout<<"Z=" << z << endl;
```

Z=11
Z=9
Z=5

(2)

```
int       A=13;
float     B=5.87,  C=41.253;
char symbol='+';
cout<<fixed << showpoint <<
setprecision(3)<<setfill(symbol);
cout<<"A ="<<setw(7)<< A << endl;
cout<<"B ="<<setw(7)<< B << endl;
cout<<setprecision(2)<<setfill('8');
cout<<"C ="<<setw(7)<< C << endl;
```

A = ++++13
B = +5.870
C = 8841.25

(3)

output.txt

```
ofstream  fout;
fout.open("output.txt");
double    T=19.2,  F= 34.5;

fout<<"Total Mark \n";
fout<<fixed<<showpoint<<
setprecision(2)<<setfill('*');

fout<< setw(6) << static_cast<int>(T)
+ F << endl;
```

Total Mark
*53.50

19
34.5
19+34.5 = 53.50

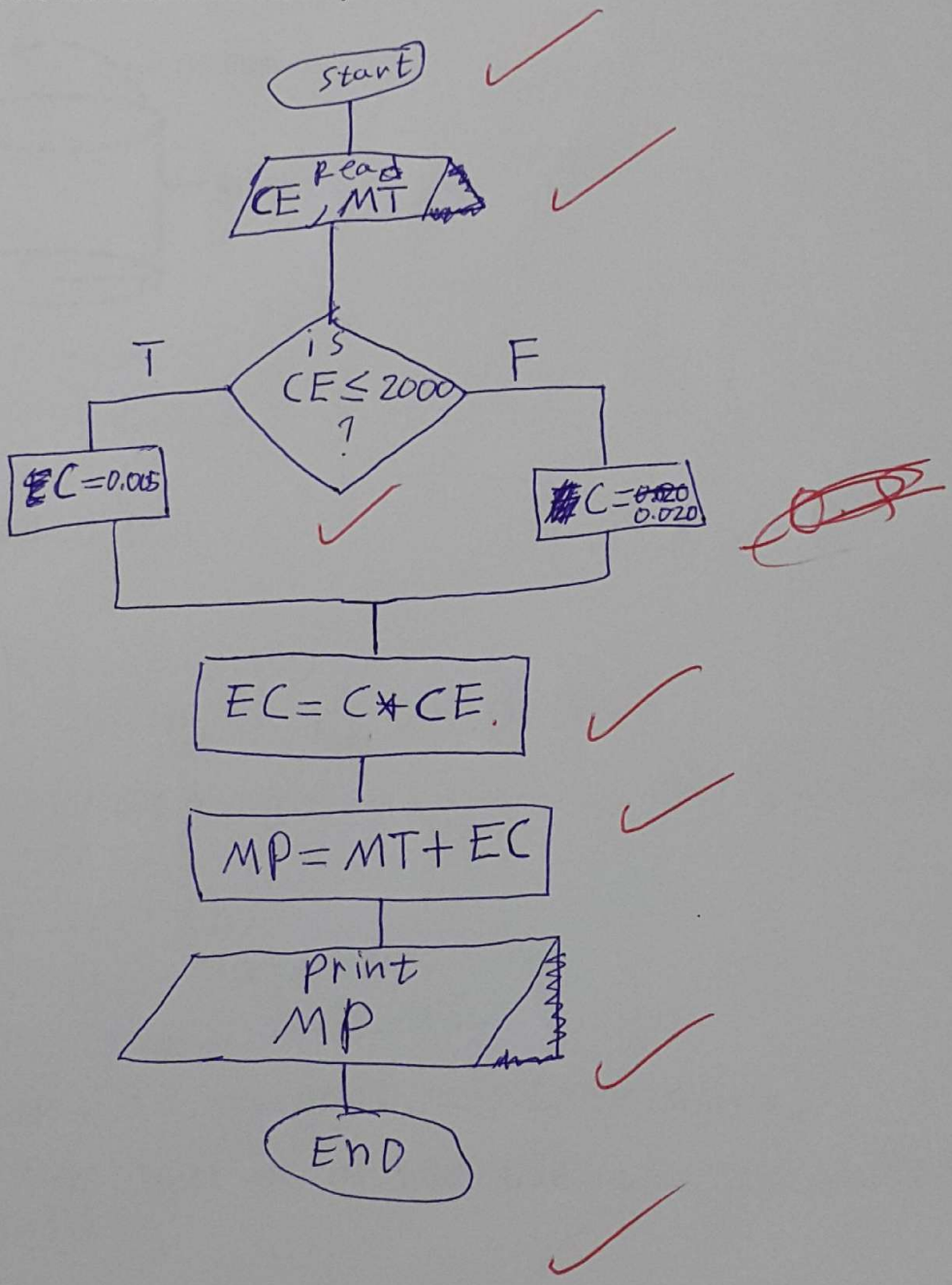
Question 3 (10 points)

Draw a flowchart for a program that:

1) Asks the user to enter from the keyboard **electricity** consumption in kilowatts (KW) and **municipality tax** in BD.
2) Calculates the cost of consumed electricity (**Elctcost**) as shown in the table below:

Consumed electricity (KW)?	0 to 2000	more than 2000
Elctcost=	0.005×electricity(KW)	0.020×electricty(KW)

3) Calculates the **monthlyPament(BD)** = **municipality tax** + **Elctcost**.
4) Displays the value of calculated **monthlyPament**.

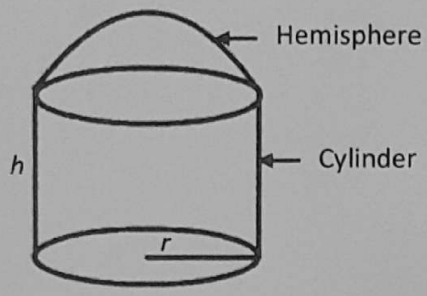


Question 4 (10 points)

A building is constructed by topping a cylindrical can with height *h* and base radius *r* with a hemispherical solid as shown below. Write a C++ program that asks the user to enter height ***h*** and radius ***r*** then calculates and displays the volume of this building (i.e. cylindrical volume plus hemispherical volume).

Building Volume = Cylindrical Volume + Hemispherical Volume
Cylindrical Volume = $\pi r^2 h$
Hemispherical Volume = $2/3\ \pi r^3$

Format your answer to two decimal places.
Hint: $\pi = 3.14$.




```
#include <iostream>
#include <iomanip>

using namespace std;

int main(){
    const double pi = 3.14;
    double h, r, Vol_HS, Vol_C, Vol_Building;
    cout << "Enter height and radius (h r): " << endl;
    cin >> h >> r;
    Vol_C = pi*r*r*h;
    Vol_HS = (2.0/3.0)*pi*r*r*r;
    Vol_Building = Vol_C + Vol_HS;
    cout << fixed << showpoint << setprecision(2);
    cout << "The Volume of the building = " << Vol_Building
         << endl;
    return 0;
}
```

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